## Climate Change and Human Health Literature Portal



# Potential effects of climate change and variability on watershed biogeochemical processes and water quality in Northeast Asia

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#### Abstract:

An overview is provided of the potential effects of climate change on the watershed biogeochemical processes and surface water quality in mountainous watersheds of Northeast (NE) Asia that provide drinking water supplies for large populations. We address major 'local' issues with the case studies conducted at three watersheds along a latitudinal gradient going from northern Japan through the central Korean Peninsula and ending in southern China. Winter snow regimes and ground snowpack dynamics play a crucial role in many ecological and biogeochemical processes in the mountainous watersheds across northern Japan. A warmer winter with less snowfall, as has been projected for northern Japan, will alter the accumulation and melting of snowpacks and affect hydro-biogeochemical processes linking soil processes to surface water quality. Soils on steep hillslopes and rich in base cations have been shown to have distinct patterns in buffering acidic inputs during snowmelt. Alteration of soil microbial processes in response to more frequent freeze-thaw cycles under thinner snowpacks may increase nutrient leaching to stream waters. The amount and intensity of summer monsoon rainfalls have been increasing in Korea over recent decades. More frequent extreme rainfall events have resulted in large watershed export of sediments and nutrients from agricultural lands on steep hillslopes converted from forests. Surface water siltation caused by terrestrial export of sediments from these steep hillslopes is emerging as a new challenge for water quality management due to detrimental effects on water quality. Climatic predictions in upcoming decades for southern China include lower precipitation with large year-to-year variations. The results from a four-year intensive study at a forested watershed in Chongquing province showed that acidity and the concentrations of sulfate and nitrate in soil and surface waters were generally lower in the years with lower precipitation, suggesting year-to-year variations in precipitation as a key factor in modulating the effects of acid deposition on soil and surface water quality of this region. Results from these case studies suggest that spatially variable patterns of snow or summer precipitation associated with regional climate change across NE Asia will have significant impacts on watershed biogeochemical processes and surface water quality, in interactions with local topography, land use change, or acid deposition.

Source: http://dx.doi.org/10.1016/j.envint.2009.10.008

#### **Resource Description**

#### Communication: **☑**

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

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Communication Audience: **☑** 

audience to whom the resource is directed

Researcher

Exposure: M

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Quality

Food/Water Quality: Chemical

Geographic Feature: **☑** 

resource focuses on specific type of geography

Freshwater, Mountain

Geographic Location: M

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Japan; Korea; China

Health Impact: M

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: General Foodborne/Waterborne Disease

Mitigation/Adaptation: **№** 

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: M

format or standard characteristic of resource

Research Article, Review

Timescale: M

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: M

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resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content